REMARKS

This application has been carefully reviewed in light of the Office Action of January 11, 2005, wherein:

A. Claims 1-12 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,423,969 to Amon.

Claim Rejections – 35 U.S.C. §103

A. Claims 1-12 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,423,969 to Amon, herein referred to as the "Amon patent."

Regarding Claim 1

In the Office Action, the Examiner rejected Claim 1 stating "Amon discloses a multi element apparatus capable of simultaneously focusing a plurality of wavebands in substantially the same focal plane (line 1 to line 43 of Col. 1), comprising, a first element comprising a first composition (10 of FIG. 1), a first index of refraction, and a first and second surface substantially perpendicular to the perimeter wherein the first surface has a first geometry and wherein the second surface has a second geometry (see table 1), a second element (11 of FIG. 1) comprising a second composition and having a thickness, a perimeter, a second index of refraction, and a first and second surface substantially perpendicular to the perimeter wherein the first surface has a third geometry and wherein the second surface has a fourth geometry (see table 1), and the first and second elements are aligned such that the second surface of the first element and the first surface of the second element are in substantial conformity with each other and aligned such that the perimeters essentially form a column." The Examiner further stated that "Amon discloses the claimed structure of the multi-element apparatus; however, the reference does not expressly teach the recited method steps of fabricating the multi-element apparatus, i.e., the objective lens." The Examiner continued stating "[h]owever, and lacking a showing to the contrary, the method steps of iteratively optimizing parameters and verifying convergence of obtained results by means of ray tracing is a building block in software design packages." The Examiner concluded "it would have been obvious, at the time of the invention was made, to a person having ordinary skill in the art to design such method steps to obtain the desired results, because the recited steps conforms to available computer design packages."

In response to the Applicants' arguments, the Examiner submitted four US patents and one US patent application as references in support of the assertions made in the Office Action. Finally, the Examiner provided ZMAX as an example of a design package.

The Applicants respectfully point out that section 706.02(j) of the MPEP sets forth that in order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck,* 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)

First, the Applicants submit that the Examiner has failed to establish a *prima facie* case of obviousness because he has failed to show how the prior art references when combined teach or suggest all the claim limitations.

Claim 1 claims, "[a] method for fabricating multi-element apparatus configured to simultaneously focus a plurality of wavebands in an approximately identical focal plane, wherein said method comprises the steps of: i. selecting a plurality of materials having unique indices of refraction and known refractive behavior for the plurality of wavebands; ii. configuring the materials such in the form of an apparatus wherein the shape of said apparatus may be predicted using successive approximation techniques to generate aspheric lens surfaces for ideal foci in one of the wavebands, and then confirm the solutions by ray tracing with Snell's law in both bands."

The Examiner stated that the Amon patent does not expressly teach the recited method steps of fabricating the multi-element apparatus. The Examiner stated that the method steps of iteratively optimizing parameters and verifying convergence of obtained results by means of ray tracing is a building block in software design packages. The Applicants refer to col. 4, lines 18-19 of the Amon patent which state "[t]he six element combination with two aspheric surfaces can be optimized on the ACCOSV optical design program." Thus, the Applicants submit that the Amon patent explicitly teaches how the optimization of the optical system of the Amon patent might be accomplished.

The Applicants note that Claim 1 does not merely claim iteratively optimizing parameters and verifying convergence by means of ray tracing. Instead, Claim 1 specifically claims "wherein the shape of said apparatus may be predicted using successive approximation techniques to generate aspheric lens surfaces for ideal foci in one of the wavebands, and then confirm the solutions by ray tracing with Snell's law in both bands."

Appendix A includes a brochure about ACCOS V from Optikos (Cambridge, MA). The brochure indicates that ACCOS V is a computer-sided-engineering program for the design and evaluation of a wide range of optical systems. The brochure explains that the optimization routines can process generally asymmetrical optical systems, and that up to five different lens configurations can be optimized simultaneously. However, the Applicants submit that the ACCOS V program does not teach, disclose or suggest that "the shape of said apparatus may be predicted using successive approximation techniques to generate aspheric lens surfaces for ideal foci in one of the wavebands, and then confirm the solutions by ray tracing with Snell's law in both bands." Specifically, there is no hint that the approximation techniques are first used to generate an aspheric lens surfaces for ideal foci in one of the wavebands, and then to confirm the solutions in both bands, as is claimed by Claim 1.

One of the patents cited by the Examiner as supporting his assertion that Claim 1 is obvious over the Amon patent is US Patent No. 5,452,031 to Ducharme, herein referred to as the "Ducharme patent." The Applicants submit that the combination of the Amon patent and the Ducharme patent does not teach, disclose, or suggest all of the elements of Claim 1.

The title of the Ducharme patent is Contact Lens and Method for Manufacturing Contact Lens. As stated in col. 2, lines 53-56, the invention disclosed in the Ducharme patent relates to a method for defining the shape of a contact lens surface by relating the surface to a reference curve. Further, col. 2, lines 65-68 state that the invention disclosed in the Ducharme patent allows the back surface shape of a contact lens to be designed so as to have any desired relationship with a real or model corneal shape including that of the periphery of the cornea. The Applicants do not understand why the Examiner believes that the Ducharme patent supports the assertion that Claim 1 is obvious over the Amon patent. The Applicants submit that the Ducharme patent does not deal with a plurality of materials having unique indices of refraction. Instead, the Applicants submit that a contact lens is made up of only one material. Further, the Ducharme patent does not teach, disclose, or suggest "wherein the shape of said apparatus may be predicted using successive approximation techniques to generate aspheric lens surfaces for ideal foci in one of the wavebands, and then confirm solutions by ray tracing with Snell's law in both bands." In fact, the Applicants are unaware how the Ducharme patent can be interpreted to suggest that the contact lenses are optimized first for one waveband and then for another. Thus, the Applicants request that the Examiner withdraw his rejection of Claim 1.

Another patent referenced by the Examiner as supporting his assertion that Claim 1 is obvious over the Amon patent is US Patent No. 5,786,940 to Robb, herein referred to as the "Robb patent." The Applicants submit that combination of the Robb patent and the Amon patent does not teach, disclose, or suggest all of the elements of Claim 1.

The title of the Robb patent is Optical System Design Optimization Using an Analytical Figure of Merit. The Applicants do not understand why the Examiner believes that the Robb patent supports the assertion that Claim 1 is obvious over the Amon patent. Starting at col. 5, line 3, the design optimization module of the Robb patent is presented. The Robb patent teaches that optical designs are corrected for spherical aberrations including spherochromatism. The Robb patent teaches that design optimization is established by analysis of a figure of merit (FMT). The Robb patent teaches that the FMT may correspond to a selected range of wavelengths, and that the design is manipulated to optimize its performance as evidenced by the FMT. The Robb patent goes on to teach that in one embodiment, the RMS spot radius for a design is calculated and averaged over a selected wavelength range to provide a value. This value, also referred to as the polychromatic RMS spot radius, is used as the FMT. The bending of the design's think lens assembly is adjusted to determine where the polychromatic RMS spot radius is minimized, and thereby determine the degree of bending that optimizes the design. By adjusting the bending of the thick lens assembly and measuring the RMS spot radius for the various curvatures of the lens elements, the designs are optimized and corrected according to performance-based criteria. While the Robb patent does teach optimization, the Applicants are unaware how the Robb patent can be interpreted to teach, disclose or suggest "wherein the shape of said apparatus may be predicted using successive approximation techniques to generate aspheric lens surfaces for the ideal foci in one of the wavebands, and then confirm the solutions by ray tracing with Snell's law in both bands," as is claimed by Claim 1. Thus, the Applicants respectfully request that the Examiner withdraw his rejection of Claim 1.

A third patent application that the Examiner referenced as supporting his assertion that Claim 1 is obvious over the Amon patent is US Patent No. 6,145,988 to Manfredini, herein referred to as the "Manfredini patent." The Applicants submit that the combination of the Manfredini and Amon patents do not teach, disclose, or suggest all of the elements in Claim 1.

The title of the Manfredini patent is Method for Contact Lens Design and Manufacturing. The abstract of the Manfredini patent states that disclosed is a contact lens manufacturing method by electronic matching of the corneal shape. Again, the Applicants do not understand why the Examiner believes that the Manfredini patent supports the assertion that Claim 1 is obvious over the Amon patent. The Applicants submit that the Manfredini patent is not dealing with a plurality of materials having unique indices of refraction. Instead, the Applicants submit that a contact lens is made up of only one material. Further, the Applicants are unaware how the Manfredini patent can be interpreted to teach, disclose, or suggest "wherein the shape of said apparatus may be predicted using successive approximation techniques to generate aspheric lens surfaces for ideal foci in one of the wavebands, and then confirm solutions by ray tracing with Snell's law in both bands." In fact, the Applicants are unaware where in the Manfredini patent there is any suggestion that the contact lenses are optimized first for one waveband and then another. Thus, the Applicants respectfully request that the Examiner withdraw his rejection of Claim 1.

Another patent cited by the Examiner as supporting his assertion that Claim 1 is obvious over the Amon patent is US Patent No. 6,222,621 to Taguchi, herein referred to as the "Taguchi patent." The Applicants submit that the combination of the Amon patent and the Taguchi patent does not teach, disclose, or suggest all of the elements of Claim 1.

The title of the Taguchi patent is Spectacle Lens Evaluation Method and Evaluation Device. The first sentence of the abstract of the Taguchi patent states "[t]he optimum optical properties of a spectacle lens that corresponds with the state in which the spectacle lens is worn by respective wearers are found and evaluated." The abstract discloses that the spectacle lens has three parameters that are used for optimization, the surface shape of the spectacle lens, the parameters of the state in which the spectacle lens is worn, such as the distance from the center of rotation, and material parameters, such as the refractive index of the spectacle lens. The Applicants submit that the Taguchi patent is not dealing with a plurality of materials having unique indices of refraction. Instead, the Applicants submit that a spectacle lens is made up of only one material. Further, the Taguchi patent does not teach, disclose, or suggest "wherein the shape of said apparatus may be predicted using successive approximation techniques to generate aspheric lens surfaces for ideal foci in one of the wavebands, and then confirm solutions by ray tracing with Snell's law in both bands." In fact, the Applicants are unaware of how the Taguchi patent can be interpreted to suggest that the spectacle lenses are optimized first for one waveband and then another. Thus, the Applicants respectfully request that the Examiner withdraw his rejection of Claim 1.

Yet another patent cited by the Examiner as supporting his assertion that Claim 1 is obvious over the Amon patent is US Application No. 2002/0196428 to Yamagata et al., herein referred to as the "Yamagata reference." The Applicants submit that the combination of the Amon patent and the Yamagata reference does not teach, disclose, or suggest all of the elements of Claim 1.

The title of the Yamagata reference is "Device for Calculating Diffraction Efficiencies of a Diffraction Lens, Lens with Grating Element, and Optical System for Reading." The field of the invention section of the Yamagata reference indicates that there are two inventions disclosed. One invention relates to a diffraction lens, and in particular to a calculation technique for calculating a diffraction efficiency of a diffraction lens that is cut with a diamond bit or molded using a die that is cut with a diamond bit, and a design technique for designing achromatic lenses. The second invention relates to an optical system for reading in which chromatic aberration is excellently corrected, and to an image reading apparatus and a bar code reader using the same. Paragraphs 0368 though 0370 discuss the calculation of the diffraction efficiency over a plurality of wavelengths. The wavelengths shown in Table 1 following paragraph 0436 are very close in length from 660 to 690 nanometers. The Applicants submit that this is not the same thing as two different wavebands as is claimed in Claim 1. In light of the focus of the Yamagata reference on optimizing the diffraction efficiency with wavelengths which are almost the same length, the Applicants submit that the Yamagata reference does not teach, disclose, or suggest "wherein the shape of said apparatus may be predicted using successive approximation techniques to generate aspheric lens surfaces for idea foci in one of the wavebands, and then confirm solutions by ray tracing with Snell's law in both bands." Thus, the Applicants respectfully request that the Examiner withdraw his rejection of Claim 1.

Finally, the Examiner referred to ZMAX as an example of a design package that supported his assertion that Claim 1 was obvious in light of the Amon patent. While the Applicants concede that ZMAX does allow computerized optical design, the Applicants do not understand how the ZMAX software teaches, discloses or suggests "wherein the shape of said apparatus may be predicted using successive approximation techniques to generate aspheric lens surfaces for the ideal foci in one of the wavebands, and then confirm the solutions by ray tracing with Snell's law in both bands." Thus, the Applicants respectfully request that the Examiner withdraw his rejection of Claim 1.

Regarding Claim 2

In rejecting Claim 2, the Examiner stated that the "combination discloses the claimed invention except for the millimeter waves being 30 GHz and 300 GHz and the infrared radiation being between .75 and 750 micrometers." The Examiner further stated that "such values are obtainable by the same method steps with proper change of desired parameters, so as to obtain versatile use lens." The Applicants respectfully disagree.

As noted above regarding Claim 1, the Examiner has failed to show where in the prior art the method steps for obtaining a multi-element apparatus as claimed in Claim 1. Further, the Applicants point out that the Amon patent teaches an infrared refractive lens triplet having color correction properties for radiation within the 3 to 12 micrometer spectral band. The Applicants submit that it is not as simple as changing the desired parameters of the invention disclosed in the Amon patent to obtain a versatile-use lens. The background section of the Amon patent, starting at line 31 notes that "[i]n the past, refractive lens systems have been designed for limited ranges, e.g., either the 3-5 or the 8-12 micrometer bands. This is because the refractive indices of the component lens materials very significantly between the two spectral bands." The Applicants note that the Amon patent merely discusses the difference between the spectral bands of 3-5 micrometers and 8-12 micrometers. The Applicants submit that the refractive indices of the component lens materials vary even more significantly between the spectral bands of 30 to 300 GHz and .75 to 750 micrometers. Thus, the Applicants submit that the prior art cited by the Examiner combined with the knowledge of one of ordinary skill in the art does not allow for the same method steps to be used to go from a multi-element apparatus which covers the spectral bands of 3-5 micrometers and 8-12 micrometers as disclosed in the Amon patent to a multi-element apparatus which covers the spectral bands from 30 to 300 GHz and .75 to 750 micrometers as is claimed in Claim 2. Thus the Applicants submit that Claim 2 is patentable over the combination of the Amon patent and the knowledge of one of ordinary skill in the art.

Regarding Claim 6

In his rejection of Claim 6, the Examiner stated that the combination discloses the claimed invention except for the apparatus having a 30-cm aperture and approximately a 71-cm focal length in both bands. The Examiner further stated that the design of the aperture and focal length is application-dependent and well-known.

As explained above with reference to Claim 1, the Amon patent, combined with the knowledge of one of ordinary skill in the art, does not teach that the apparatus disclosed in the Amon patent can be modified to cover spectral bands from 30 to 300 GHz and .75 to 750 micrometers. Claim 6 claims, in part, "a first element consisting essentially of zinc selenide and having an index of refraction of approximately 2.43 for the millimeter wave region and approximately 3.01 for infrared region ... a second element having an index of refraction of approximately 2.25 for the millimeter wave region and approximately 2.90 for the infrared region ... and wherein the first element has a 30-cm aperture and 71-cm focal length for both the millimeter wave and infrared regions." Thus, the Applicants submit that Claim 6 is patentable over the cited prior art references and the knowledge of one of ordinary skill in the art.

Regarding Claim 7

In rejecting Claim 7, the Examiner used the same arguments as he did to reject Claim 1. Again, the Applicants submit that neither the Amon patent nor the knowledge of one skilled in the art, as evidenced by the four US patent applications and one US patent publication, teach, disclose, or suggest all of the elements set forth in Claim 7.

Claim 7 claims, in part, "iteratively vary the image point position, lens surface, and lens thickness until a first lens configuration is found that provide substantial convergence of a first waveband at an image point; constrain a plurality of the iterated values, including the focal point and a object point and iteratively vary the lens shapes and thicknesses until a second lens configuration is found that provides substantially convergence in the second waveband; and combine the properties of the first and second lens, so as to optimize the dual waveband convergence."

As discussed regarding Claim 1, the Ducharme patent relates to a method for defining the shape of a contact lens. The Applicants do not understand how the Examiner is interpreting the Ducharme patent to teach, disclose, or suggest a first lens configuration and a second lens configuration. Since there is only one lens in the Ducharme patent and three lenses in the Amon patent, the Applicants are unclear how the Examiner is combining them to teach the method claimed in Claim 7. Additionally, the Applicants believe that the contact lens in the Ducharme patent is optimized to fit the cornea of the patient, and not to provide substantial convergence of a first waveband or a second waveband as is claimed in Claim 7. In light of the foregoing, the Applicants submit that the combination of the Ducharme and Amon patents do not teach, disclose, or suggest all of the elements of Claim 7. Therefore, the Applicants respectfully request that the Examiner withdraw his rejection of Claim 7.

As discussed regarding Claim 1, the Robb patent relates to a method of optimization using a figure of merit. Again, the Applicants do not understand how the Examiner is interpreting either the Amon or the Robb patent to teach, disclose, or suggest "iteratively varying the image point position, lens surface, and lens thickness until a first lens configuration is found that provides substantial convergence of a first waveband ... constrain a plurality of the iterated values, including the focal point and object point and iteratively vary the lens shapes and thicknesses until a second lens configuration is found that provides substantially convergence in the second waveband; and combine the properties of the first and second lens, so as to optimize the dual waveband convergence." The Applicants are unaware where in the Robb patent dual waveband convergence and optimization for the same is taught, disclosed or suggested. Thus, the Applicants submit that Claim 7 is patentable over the combination of the Amon and Robb patents.

As discussed regarding Claim 1, the Manfredini patent discloses contact lens manufacturing methods. The Applicants do not understand how the Examiner is interpreting the Manfredini patent to teach, disclose, or suggest a first lens configuration and a second lens configuration. Since there is only one lens in the Manfredini patent and three lenses in the Amon patent, the Applicants are unclear how the Examiner is combining them to teach the method claimed in Claim 7. Additionally, the Applicants believe that the contact lens in the Manfredini patent is optimized to fit the cornea of the patient, and not to provide substantial convergence of a first waveband or a second waveband as is claimed in Claim 7. In light of the foregoing, the Applicants submit that the combination of the Manfredini and Amon patents do not teach, disclose, or suggest all of the elements of Claim 7. Therefore, the Applicants respectfully request that the Examiner withdraw his rejection of Claim 7.

As discussed regarding Claim 1, the Taguchi patent teaches spectacle lens evaluation. The Applicants do not understand how the Examiner is interpreting the Taguchi patent to teach, disclose, or suggest a first lens configuration and a second lens configuration. Since there is only one lens in the Taguchi patent and three lenses in the Amon patent, the Applicants are unclear how the Examiner is combining them to teach the method claimed in Claim 7. Additionally, the Applicants believe that the spectacle lens in the Taguchi patent is optimized based on the distance the patient's eyes are from the spectacle lens, and not to provide substantial convergence of a first waveband or a second waveband as is claimed in Claim 7. In light of the foregoing, the Applicants submit that the combination of the Taguchi and Amon patents do not teach, disclose, or suggest all of the elements of Claim 7. Therefore, the Applicants respectfully request that the Examiner withdraw his rejection of Claim 7.

As discussed regarding Claim 1, the Yamagata reference discloses optimizing for diffraction efficiency. The Applicants do not understand how the Examiner is interpreting the Yamagata reference to teach, disclose, or suggest a first lens configuration and a second lens configuration which provides substantial convergence of a first waveband or a second waveband as is claimed in Claim 7. In light of the foregoing, the Applicants submit that the combination of the Yamagata and Amon patents do not teach, disclose, or suggest all of the elements of Claim 7. Therefore, the Applicants respectfully request that the Examiner withdraw his rejection of Claim 7.

As stated regarding Claim 1, the Applicants do not understand how the optical design package of ZMAX teaches the method disclosed in Claim 7. Therefore, the Applicants respectfully request that the Examiner withdraw his rejection of Claim 7.

Regarding Claim 8

Claim 8 claims, in part, "wherein the dual wavebands are substantially confined to the infrared and mm-wave waveband regions." As stated regarding Claim 2, the Applicants submit that none of the references cited by the Examiner teach, disclose, or suggest being able to support convergence of both infrared and mm-wave wavebands. Further, the Applicants submit that modifying any of the systems in the prior art provided by the Examiner to support the convergence of both infrared and mm-wave wavebands is not within the ordinary skill of the art. Therefore, the Applicants respectfully request that the Examiner withdraw his rejection of Claim 8.

Regarding Claims 2-6 and 8-12

Claims 2-6 and 8-12 are dependent upon Claims 1 and 7 respectively. For the reasons given above, the Claims 1 and 7 are patentable over the cited prior art. Thus, Claims 2-6 and 8-12 are also patentable at least through their dependence upon an allowable base claim.

Concluding Remarks:

The Applicant respectfully submits that in light of the above comments and remarks, all claims are now in allowable condition. The Applicant thus respectfully requests timely allowance of all of the pending claims.

In the event the Examiner wishes to discuss any aspect of this response, or believes that a conversation with either Applicant or Applicant's representative would be beneficial the Examiner is encouraged to contact the undersigned at the telephone number indicated below.

The Commissioner is authorized to charge any additional fees which may be required or credit overpayment to deposit account no. 50-2691 or the credit card used for payment, if applicable. In particular, if this response is not timely filed, the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of the number of months necessary to make this response timely filed. The petition fee due in connection therewith may be charged to deposit account no. 50-2691.

Respectfully submitted,

Cary Tope-McKay
Registration No. 41,350
Tel.: (310) 589-8158

Appendix A

ACCOS V™

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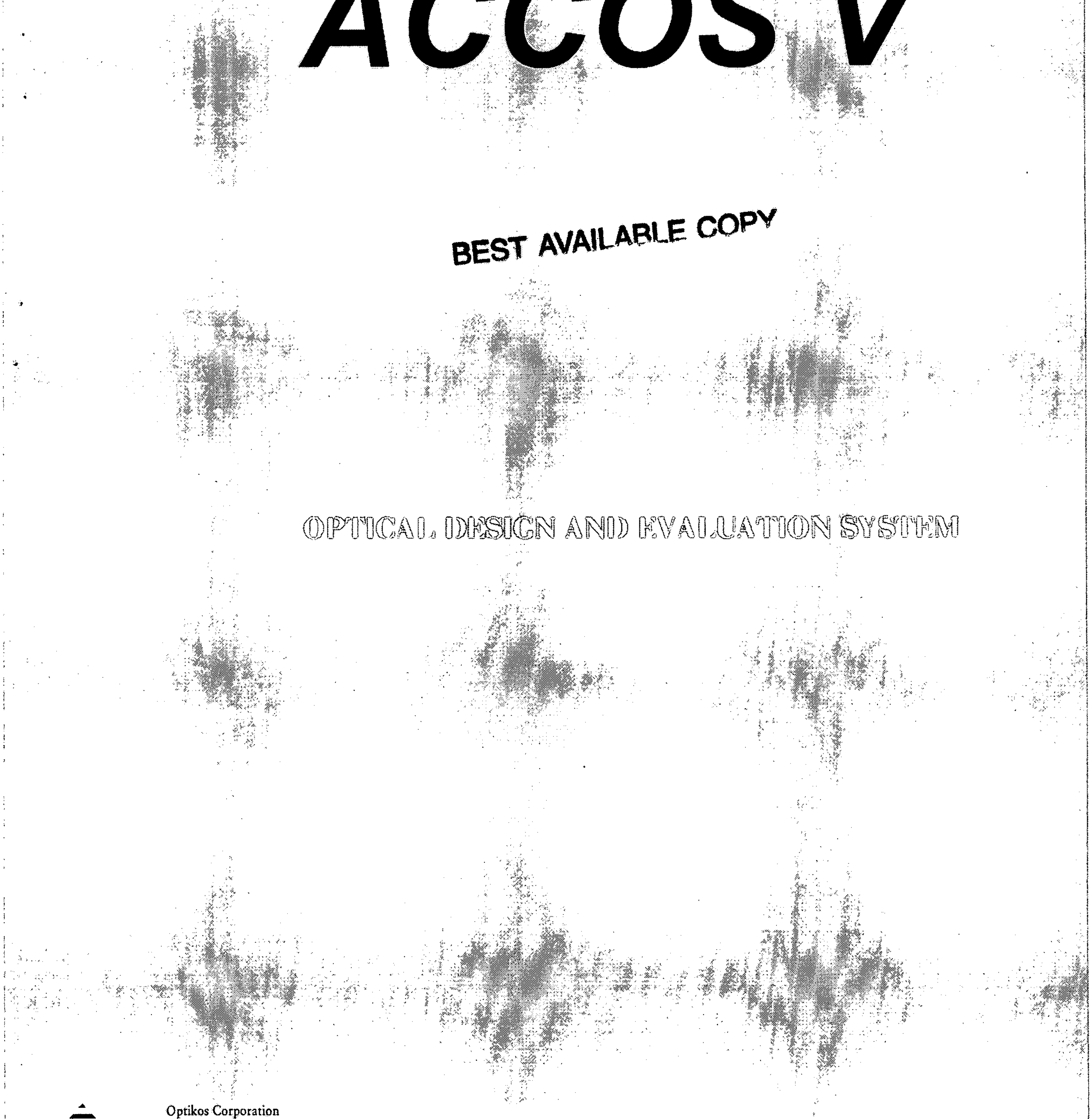

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Speed Ease Flexibility
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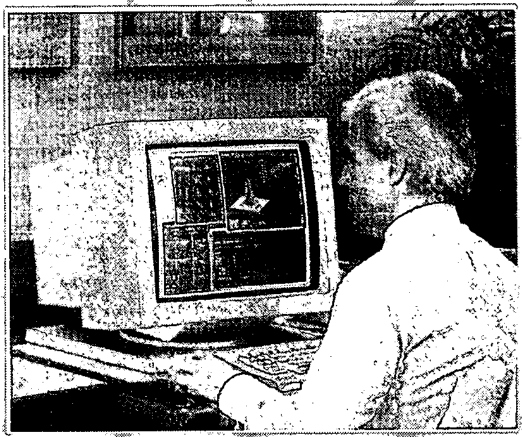

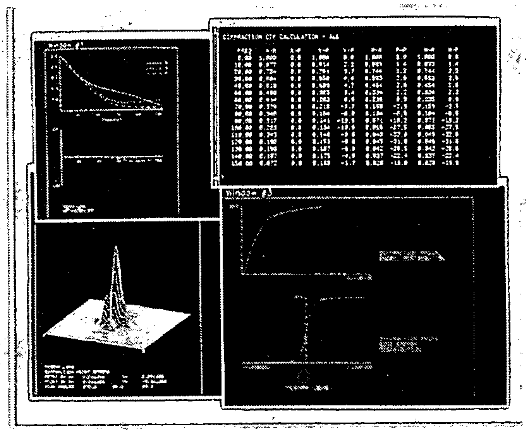

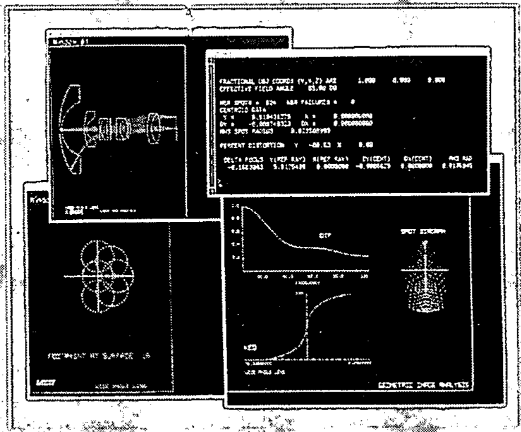

Three longstanding reasons why ACCOS V has been the design and evaluation system of choice for some of the world's leading optical professionals since 1963 - longer than any optical CAE software on the market.

ACCOS V from Optikos Corporation, is today's most comprehensive computer-sided-engineering program for the design and evaluation of a wide range of optical systems. Constantly meets the demands of changing technology in optical systems for government, industry and research. In aerospace, navigation, photography, lasers, fiber optics and medicine...wherever precise imaging is vital to products and progress.

☐**Speed.** ACCOS V is fast and nowhere is that more evident than in its diffraction analysis: fast, on-target evaluation of the most complex designs, with options including through-focus and polychromatic spread capabilities, detector scans, and Zernike wavefront coefficients. Apodization may be entered as a rotationally symmetric table of data or via various formula representations including gaussian, linear or exponential, allowing a variable amplitude transmission mask to be imposed on the system, a feature particularly useful in laser applications.

☐**Ease.** ACCOS V is very easy to use, employing its straight-forward commands which provide users with the information they need, when they need it. A powerful MACRO processor subsystem allows the designer to store, modify and execute sequences of commands. In addition to fast and easy data storage, MACROS may utilize nesting, input/output, arithmetic and test/branch facilities.

☐**ACCOS V** brings a new dimension to ease of use in optical design software.

☐**Flexibility**. One of the most important qualities of optical design software is flexibility; the designer must have the capability to tailor programs to the particular task at hand. From the highly interactive nature of operation to the powerful macro facility, to the extensive graphics options, ACCOS V has been designed with this in mind. ACCOS V is today's most user-oriented optical design system.
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More reasons why ACCOS V gets the job done right

- A global coordinate system may be used to specify each optical surface's position and orientation with respect to any system surface. This feature is particularly useful in systems that do not have a single optical axis. Groups of surfaces may also be tilted and decentered with respect to any point in the global coordinate system. Conversion between relative and global coordinates may be performed easily.

- The *ACCOS V* optimization routines can process generally asymmetrical optical systems, including elements which are titled, decentered, irregular in shape, and wide-angle systems with fields of view greater than 180 degrees. Up to five different lens configurations can be optimized simultaneously. This feature is typically used for zoom lens design, but it can also be employed for scanning systems, turret microscopes and other applications, since not only spacing but tilt angles, decentrations and curvatures can have independent values - and be varied independently - in each configuration.

- Default merit functions are available in optimization, or users may construct their own figure of merit using the most comprehensive and flexible optical system correction features available on the market. **A pseudo-global search option** may also be utilized to assist the designer in locating the global minimum.

- Surface types include aspheric, toric, spline, polynomial, Zernike, fresnel, HOE, and linear, radial and circular diffraction gratings. Optical materials include **GRIN** media, glass catalogs and other special materials.

- A generally irregular surface, or generally irregular profile, which generates a rotationally symmetric irregular surface, can be defined by input of unevenly spaced sag points. Spline interpolation techniques are used to define the surface shape from the sag points. The sags can be modified easily during optimization to produce the desired imagery.

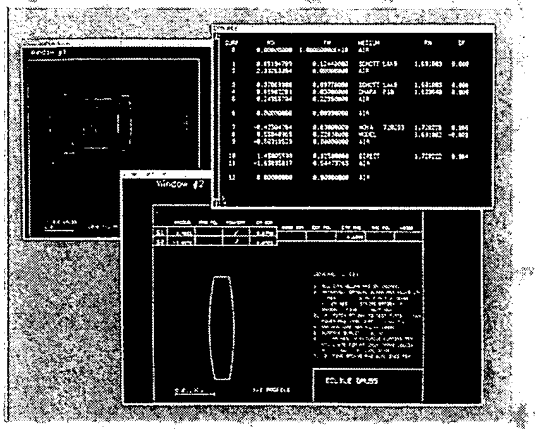
- A full range of geometrical analysis options are available, including spot diagrams, through-focus optical transfer functions, **footprints**, detector scans, radial energy distributions and knife edge distributions.

- Tolerancing options include worst-case, change tables and the most flexible statistical tolerancing functions available today. The optical system may be randomly varied in a variety of ways, and the effects on virtually any analysis criteria may then be calculated automatically an arbitrary number of times.

- Melles Griot and Newport lens databases are stored within the program for easy recall and insertion into any optical system.

- The workstation environment includes up to five full-color graphics windows in addition to the text window.

Hardware compatibility is another good reason to make *ACCOS V* your complete turnkey design system. *ACCOS V* is available on PC, UNIX and Sun workstations. These platforms have clearly emerged as the price/performance leaders for all major engineering applications. Both provide superb flexibility, networking capabilities, resource sharing and open systems architecture.



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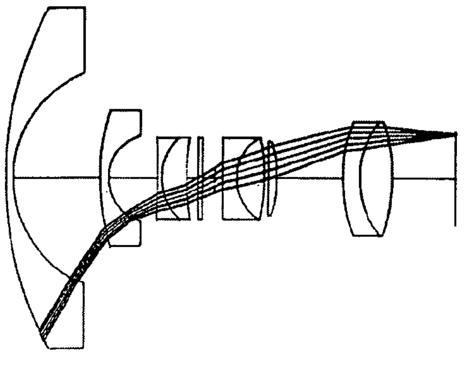
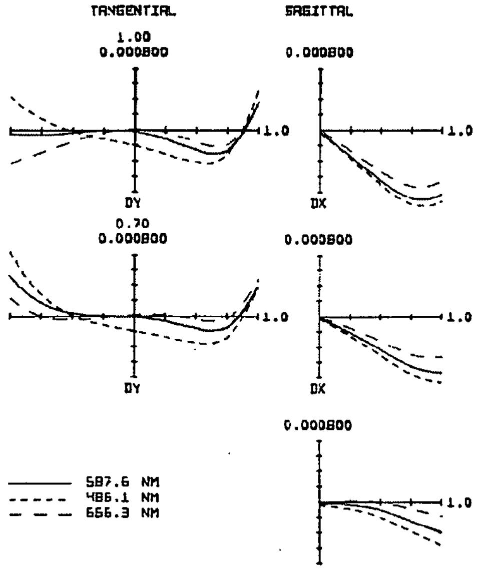
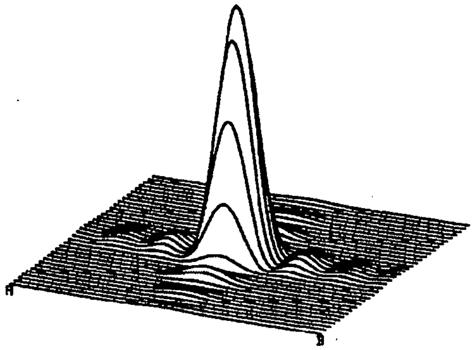


WIDE ANGLE LENS (85 DEG FIELD OF VIEW)
LENS Y-Z PROFILE

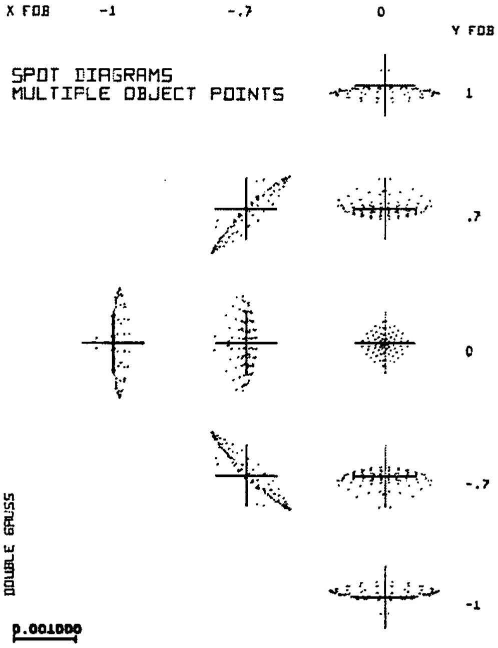


RAY FANS

DOUBLE GAUSS



PARABOLOIDAL MIRROR - SQUARE APERTURE
DIFFRACTION POINT SPREAD
POINT A: X= 0.000204 Y= 0.000204
POINT B: X= 0.000204 Y= -0.000204
VIEW ANGLES 270.0 20.0 20.0



SPOT DIAGRAMS
MULTIPLE OBJECT POINTS